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ДО ДАНО-ЕМПІРИЧНОЇ ОРГАНІЗАЦІЙНОЇ АДАПТАЦІЇ: КОНЦЕПТУАЛЬНИЙ АНАЛІЗ ФРАГМЕНТАЦІЇ АДАПТАЦІЙНИХ МОЖЛИВОСТЕЙ У МОДЕЛЯХ AGILE-ТРАНСФОРМАЦІЇ

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TOWARD DATA-EMPIRICAL ORGANIZATIONAL ADAPTATION: A CONCEPTUAL ANALYSIS OF FRAGMENTED ADAPTATION CAPABILITIES IN AGILE TRANSFORMATION MODELS

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Анотація. *У статті досліджуються структурні обмеження сучасних моделей Agile-трансформації в умовах організаційних середовищ, підсилених технологіями штучного інтелекту. Традиційні Agile-фреймворки формувалися в умовах періодичної емпіричної адаптації, де організаційне навчання ґрунтувалося на циклічних механізмах інспекції, координації та людської інтерпретації. Інтеграція штучного інтелекту, AI-assisted workflow-механізмів та безперервної операційної телеметрії змінює природу організаційного навчання, формуючи умови безперервного збору та інтерпретації сигналів (continuous sensing) і прискореного зворотного зв'язку. Метою дослідження є аналіз структурних адаптаційних обмежень сучасних Agile-моделей та позиціонування Data-Empirical Agility Model (DEAM) як синтетичної архітектури безперервної організаційної адаптації. Методологічну основу роботи становлять концептуально-порівняльний аналіз, системне мислення та підхід Design Science Research. У дослідженні проаналізовано Scrum, Scrum@Scale, SAFe, LeSS, Kanban Maturity Model, Evidence-Based Management, Agile Operating Model та Agile Product Operating Model. Результати дослідження демонструють, що сучасні Agile-підходи еволюціонували шляхом спеціалізації адаптаційних можливостей у сферах координації, управління (governance), вимірювання (measurement) та організаційного узгодження (organizational alignment). Водночас ці можливості залишаються структурно фрагментованими в умовах безперервного збору сигналів. У статті введено поняття fragmentation of adaptation capabilities (фрагментація адаптаційних можливостей), що описує структурне розділення механізмів збору сигналів, управління, вимірювання, координації та організаційного навчання в сучасних моделях Agile-трансформації. Також концептуалізовано adaptation latency як часовий розрив між генерацією операційних сигналів та узгодженою організаційною реакцією. DEAM позиціонується не як заміна існуючих Agile-фреймворків, а як синтетична архітектура, що інтегрує механізми безперервного збору сигналів, адаптивні цикли зворотного зв'язку та data-empirical organizational learning у єдину систему безперервної організаційної адаптації.*

Ключові слова: *Agile-трансформація; організаційна адаптація; Data-Empirical Agility Model (DEAM); безперервний збір та інтерпретація сигналів (continuous sensing); фрагментація адаптаційних можливостей (adaptation capability fragmentation); організації, підсилені технологіями штучного інтелекту.*

Формули: 0; Рис.: 1; Табл.: 2; Бібл.: 17

Abstrakt. *The paper analyzes structural adaptation limitations of contemporary Agile transformation models under AI-augmented organizational conditions. Traditional Agile frameworks evolved within environments characterized by periodic empirical adaptation and bounded feedback cycles. However, continuous telemetry generation, AI-assisted workflows and accelerated operational feedback fundamentally change organizational learning conditions. The purpose* *of the study is to analyze adaptation limitations embedded within major Agile transformation approaches and to position the Data-Empirical Agility Model (DEAM) as a synthesis architecture for continuous organizational adaptation. The research applies comparative conceptual analysis, systems thinking and Design Science Research positioning to examine Scrum, Scrum@Scale, SAFe, LeSS, Kanban Maturity Model, Evidence-Based Management, Agile Operating Model and Agile Product Operating Model. The analysis demonstrates that existing Agile approaches evolved through progressive specialization of adaptation capabilities related to coordination, governance, maturity progression and empirical measurement. Nevertheless, these mechanisms remain structurally fragmented under continuous sensing conditions. The study introduces the concept of adaptation capability fragmentation describing the structural separation of sensing, governance, measurement, coordination and organizational learning mechanisms across Agile transformation models. The paper further conceptualizes adaptation latency as the temporal gap between operational signal generation and coordinated organizational response. Within this context, DEAM is positioned not as a replacement framework, but as a synthesis architecture integrating continuous sensing, adaptive feedback loops and data-empirical organizational learning into coherent adaptive systems.*

Keywords: *Agile transformation; organizational adaptation; DEAM; continuous sensing; adaptation capability fragmentation; AI-augmented organizations.*

Formulas: 0; Figures: 1; Tab.: 2; Bibl.: 17

Introduction. Agile transformation models emerged under organizational conditions where adaptation remained periodic, bounded and dependent on human-mediated empirical coordination. Early Agile frameworks relied on iterative delivery, empirical process control and short feedback cycles enabling teams to inspect and adapt under changing operational conditions (Beck et al., 2001; Schwaber & Sutherland, 2020). Over time, Agile transformation evolved toward broader organizational redesign involving governance systems, scaling models, operating structures and enterprise-wide adaptive capabilities.

At the same time, artificial intelligence technologies increasingly transform organizational learning conditions. AI-assisted workflows, automated analytics and integrated delivery telemetry continuously generate operational signals across organizational systems. As a result, organizations operate under conditions characterized by denser feedback dynamics and accelerated operational sensing.

Traditional Agile systems evolved under assumptions that adaptation occurs through periodic synchronization events such as Sprint Reviews, Retrospectives or Planning increment synchronization events. AI-augmented environments destabilize these assumptions by generating operational telemetry at a speed exceeding the synchronization capacity of many governance and organizational learning structures.

Under such conditions, limitations of existing Agile transformation approaches become increasingly visible. Coordination, governance, measurement and organizational learning mechanisms are frequently optimized independently rather than integrated into coherent adaptive architectures. This fragmentation may produce delayed organizational response, disconnected feedback interpretation and unstable learning dynamics.

Recent studies increasingly emphasize the importance of systems thinking, organizational learning and adaptive governance in digitally transforming environments (Senge, 2006; Snowden & Boone, 2007; Meadows, 2008). Research on large-scale Agile transformation demonstrates that fragmented coordination structures continue to constrain organizational adaptability (Larman & Vodde, 2016). Parallel studies on AI adoption indicate that technological augmentation alone does not automatically produce coherent organizational transformation (Jarrahi, 2018; Brynjolfsson & McAfee, 2014). Prior conceptualization of the Data-Empirical Agility Model (DEAM) additionally suggests that Agile organizations are gradually transitioning from traditional empirical learning toward data-empirical organizational adaptation under AI-assisted sensing conditions (Lukutin & Michkivskyy, 2026).

Within this study, the term “data-empirical” refers to organizational adaptation integrating empirical learning mechanisms with continuous operational data sensing and AI-assisted telemetry interpretation.

Despite the growing number of Agile frameworks and operating models, limited attention has been devoted to integration of adaptation capabilities under continuous sensing conditions. Existing studies predominantly address governance, scaling, measurement or AI adoption separately.

Existing Agile transformation approaches provide strong mechanisms for governance, coordination and measurement independently. However, limited research addresses integration of these capabilities into continuous organizational learning architectures operating under AI-augmented sensing conditions.

Accordingly, the purpose of this study is to analyze structural adaptation limitations of contemporary Agile transformation models under AI-augmented conditions and to position DEAM as a synthesis architecture for continuous organizational adaptation.

Literature Review. Contemporary Agile transformation research includes a broad ecosystem of frameworks, scaling approaches, practices and organizational operating models intended to improve adaptability and value delivery. Although these approaches differ in structure and implementation logic, most evolved around adaptation assumptions shaped by bounded empirical coordination.

Scrum, as a foundational framework for most of Agile operating approaches, institutionalized iterative empirical coordination through periodic synchronization cycles optimized for relatively stable feedback environments (Beck et al., 2001; Schwaber & Sutherland, 2020). Scrum@Scale extended this logic toward enterprise-level synchronization and transparency (Scrum@Scale, 2024). However, both approaches remain dependent on event-driven coordination structures.

Governance-centric approaches such as SAFe expanded Agile transformation toward portfolio alignment and enterprise planning (Knaster & Leffingwell, 2020). Nevertheless, governance synchronization within such models remains strongly dependent on planning cadences and centralized coordination layers, potentially reinforcing adaptation latency under continuous sensing conditions.

LeSS emphasized organizational simplification and systems-level transparency (Larman & Vodde, 2016). At the same time, organizational learning within LeSS continues to rely primarily on bounded human-centered feedback cycles.

The Kanban Maturity Model conceptualized adaptation as progressive organizational capability evolution (Anderson & Carmichael, 2019). However, stage-oriented adaptation may become insufficient under accelerated feedback conditions requiring continuous synchronization of organizational learning.

Measurement-centric approaches such as Evidence-Based Management strengthened empirical visibility and outcome-oriented learning (Scrum.org, 2024). Nevertheless, measurement systems frequently remain structurally separated from continuous sensing and adaptive coordination architectures.

More recent operating-system approaches including Agile Operating Model and Agile Product Operating Model conceptualize organizations as interconnected adaptive ecosystems (Scrum.org, 2023; Denning, 2018). However, continuous sensing integration and adaptive telemetry interpretation remain insufficiently formalized within their structural logic.

Recent studies additionally demonstrate that AI increasingly transforms organizational coordination and operational learning dynamics (Jarrahi, 2018; Brynjolfsson & McAfee, 2014; Davenport & Ronanki, 2018; McKinsey & Company, 2024; Lukutin & Michkivskyy, 2026). Organizations adopting AI technologies frequently experience asymmetry between rapidly expanding sensing capabilities and slower evolution of governance and learning structures.

Although these approaches significantly expanded Agile transformation capabilities, their evolution primarily followed functional specialization rather than integration of continuous organizational learning architectures. Coordination, governance, measurement and organizational learning mechanisms therefore remain weakly integrated under accelerated feedback conditions.

Within this context, the present study introduces the concept of adaptation capability fragmentation describing the structural separation of sensing, governance, measurement, coordination and organizational learning mechanisms across Agile transformation models.

Aim and Methodology. *Aim of the Study*. The increasing integration of AI technologies into Agile organizational environments fundamentally changes conditions under which organizational learning and adaptation occur. Existing Agile transformation models continue to depend on periodic synchronization cycles despite increasingly continuous operational feedback.

Accordingly, the purpose of this study is to analyze structural adaptation limitations of contemporary Agile transformation approaches under AI-augmented conditions and to position the Data-Empirical Agility Model (DEAM) as a synthesis architecture for continuous organizational adaptation.

The objectives of the study are:

1.To analyze adaptation assumptions embedded within major Agile transformation approaches.

2.To examine distribution of adaptation capabilities across governance, coordination, sensing and organizational learning dimensions.

3.To identify adaptation capability fragmentation as a systemic limitation of contemporary Agile transformation models.

4.To analyze organizational implications of adaptation latency under AI-augmented conditions.

5.To position DEAM as an integrated architecture for continuous organizational adaptation.

Methodology. The study applies a conceptual-comparative research design focused on analyzing structural adaptation logic embedded within contemporary Agile transformation models. The methodological foundation combines systems thinking, organizational learning perspectives and Design Science Research positioning.

The research interprets Agile organizations as adaptive learning systems operating through interconnected feedback loops, governance mechanisms and sensing architectures. From this perspective, organizational adaptability depends not only on the existence of feedback mechanisms themselves, but also on continuity and synchronization of operational signals across organizational layers.

The study applies comparative conceptual analysis across several categories of Agile transformation approaches:

-coordination-centric frameworks;

-governance-centric scaling models;

-maturity-oriented systems;

-measurement-centric approaches;

-organizational operating models.

The comparative analysis focuses on adaptation assumptions related to sensing continuity, governance synchronization, feedback integration, organizational learning structures and coordination mechanisms. The comparison criteria include continuity of sensing, synchronization of governance processes, integration of organizational learning loops and adaptability of coordination architectures under AI-augmented conditions.

DEAM is interpreted not as an isolated transformation framework requiring direct empirical validation, but as a conceptual synthesis architecture integrating fragmented adaptation capabilities into continuous organizational learning systems.

The analytical procedure includes:

1.identification of dominant adaptation assumptions;

2.comparative analysis of adaptation capabilities;

3.examination of structural limitations under continuous sensing conditions;

4.conceptual integration of fragmented adaptation mechanisms.

The study is conceptual-comparative in nature and does not include statistical validation of proposed constructs.

Within the Design Science Research perspective, DEAM is interpreted as a conceptual organizational artifact intended to address structural fragmentation of adaptation capabilities under AI-augmented organizational conditions. The study focuses on problem identification, conceptual artifact positioning and comparative analysis of adaptation architectures rather than empirical artifact validation.

Results. *Continuous Sensing and Organizational Adaptation Pressure.* The integration of AI technologies into software-intensive organizational environments significantly changes the density and continuity of operational feedback available to Agile systems. Unlike earlier stages of Agile transformation, where adaptation relied on bounded inspection events, AI-augmented environments continuously generate operational telemetry through delivery pipelines, AI-assisted workflows and integrated collaboration systems.

As a result, organizational adaptation increasingly depends on sensing architectures capable of integrating fragmented information flows across organizational layers. Continuous sensing environments generate accelerated feedback dynamics and increase synchronization pressure between governance, coordination and organizational learning structures.

Under such conditions, organizations increasingly experience adaptation latency - the temporal gap between operational signal generation and coordinated organizational response. This latency becomes especially visible when governance structures and organizational learning processes evolve at different speeds.

Consequently, Agile transformation increasingly shifts from framework implementation toward design of integrated organizational learning architectures capable of interpreting operational telemetry and stabilizing adaptive learning dynamics.

Structural Fragmentation of Adaptation Capabilities. The comparative analysis demonstrates that contemporary Agile transformation models evolved through progressive specialization of organizational adaptation capabilities. Rather than functioning as unified learning architectures, most approaches optimize separate dimensions of adaptability including coordination, governance, measurement or organizational alignment.

Scrum and Scrum@Scale primarily optimize iterative synchronization and bounded empirical adaptation. SAFe strengthens governance and portfolio alignment but remains dependent on cadence-based synchronization. KMM emphasizes organizational capability evolution, while EBM focuses on evidence-driven visibility. AOM and APOM strengthen product-centric alignment and enterprise adaptability.

Consequently, adaptation capabilities become distributed unevenly across organizational dimensions:

-coordination evolves separately from governance synchronization;

-measurement evolves separately from adaptive learning;

-sensing evolves separately from organizational response architectures.

This structural separation creates adaptation capability fragmentation — the distributed and weakly integrated nature of sensing, governance, measurement, coordination and learning mechanisms across Agile transformation models.

Under AI-augmented conditions, fragmentation becomes increasingly problematic because organizations accumulate operational signals faster than existing adaptation architectures can coherently process them.

Table 1

Structural Fragmentation of Adaptation Capabilities Across Agile Transformation Models

Adaptation Capability	Dominant Models	Primary Organizational Strength	Structural Limitation Under Continuous Sensing Conditions
Coordination	Scrum, Scrum@Scale	Iterative synchronization	Periodic adaptation dependency
Governance	SAFe	Portfolio alignment	Governance adaptation latency
Maturity evolution	KMM	Organizational capability progression	Sequential adaptation logic
Measurement	EBM	Evidence-driven visibility	Weak integration with continuous sensing
Operating alignment	AOM, APOM	Product-centric organizational coherence	Limited adaptive telemetry integration
Continuous adaptive integration	DEAM	Integrated adaptive learning architecture	Requires organizational redesign capability

Source: developed by the Authors

Adaptation Latency and Learning Instability. Fragmented adaptation architectures generate broader organizational consequences under conditions of continuous sensing and accelerated operational feedback. AI-assisted environments continuously surface operational signals related to workflow interruptions, dependency accumulation, quality degradation and coordination overload. However, organizational response mechanisms frequently remain dependent on slower governance synchronization structures.

As a result, organizations increasingly experience unstable learning dynamics characterized by delayed interpretation of operational signals, asynchronous adaptation and fragmented coordination response.

This condition may be conceptualized as learning instability — a state in which organizational feedback cycles become difficult to synchronize due to fragmentation between sensing, governance and adaptive coordination mechanisms.

Under such conditions, organizations risk entering states of pseudo-adaptation where operational responsiveness appears to increase while organizational learning itself remains structurally fragmented.

Table 2

Conceptual Operationalization of DEAM Constructs

DEAM Construct	Conceptual Indicator
Adaptation latency	Delay between operational signal generation and coordinated organizational response
Adaptation capability fragmentation	Degree of structural separation between sensing, governance, coordination and learning mechanisms
Continuous sensing	Density and continuity of operational telemetry and feedback generation
Learning instability	Inconsistency and desynchronization of organizational learning cycles
Adaptive integration	Degree of synchronization between sensing, governance and organizational adaptation mechanisms

Source: developed by the Authors

DEAM as a Synthesis Architecture for Continuous Organizational Adaptation. The identified fragmentation of adaptation capabilities suggests that organizations increasingly require integrated architectures capable of continuously synchronizing sensing, interpretation, governance and adaptive coordination.

Within this context, DEAM can be positioned as a synthesis architecture for continuous organizational adaptation under AI-augmented conditions.

Operationally, DEAM assumes continuous integration of organizational sensing, adaptive interpretation, governance synchronization and empirical learning loops through interconnected feedback architectures. Within such environments, organizational adaptation occurs through iterative synchronization between operational telemetry, AI-assisted analytical augmentation and human-centered governance mechanisms.

Unlike traditional Agile frameworks relying on periodic synchronization events, DEAM conceptualizes organizations as continuous data-empirical learning systems integrating operational sensing, adaptive interpretation and organizational learning into interconnected feedback architectures.

Within DEAM, AI systems primarily function as sensing amplification and analytical augmentation mechanisms rather than autonomous organizational decision-makers. Human actors remain responsible for contextual interpretation and governance alignment.

The primary contribution of DEAM lies in integrating fragmented adaptation dimensions into coherent organizational learning architecture where coordination, governance, sensing and learning mechanisms operate as interconnected components of continuous adaptation.

Discussion. The conducted analysis suggests that contemporary Agile transformation increasingly encounters structural limitations not because organizations lack adaptation mechanisms, but because these mechanisms remain weakly integrated under conditions of continuous sensing and accelerated operational feedback.

Historically, Agile transformation was primarily interpreted as framework adoption, scaling implementation or process redesign. The present study suggests that Agile transformation increasingly becomes a problem of organizational adaptation architecture design.

Within this context, the concept of adaptation capability fragmentation explains why many organizations experience asymmetry between sensing capability and organizational adaptability. AI technologies amplify operational visibility and feedback density, yet governance synchronization and organizational learning frequently evolve more slowly.

The findings additionally reinforce systems thinking perspectives (Senge, 2006; Meadows, 2008) emphasizing that organizational effectiveness emerges not from isolated optimization of individual mechanisms, but from coherence between interconnected organizational structures.

Consequently, organizations integrating AI technologies into Agile environments increasingly face a systemic redesign challenge involving reduction of adaptation latency, integration of fragmented learning loops and synchronization of operational telemetry with governance structures.

The conceptual validity of DEAM emerges from synthesis of adaptation capabilities distributed across existing Agile transformation approaches and from alignment with systems thinking and organizational learning theories.

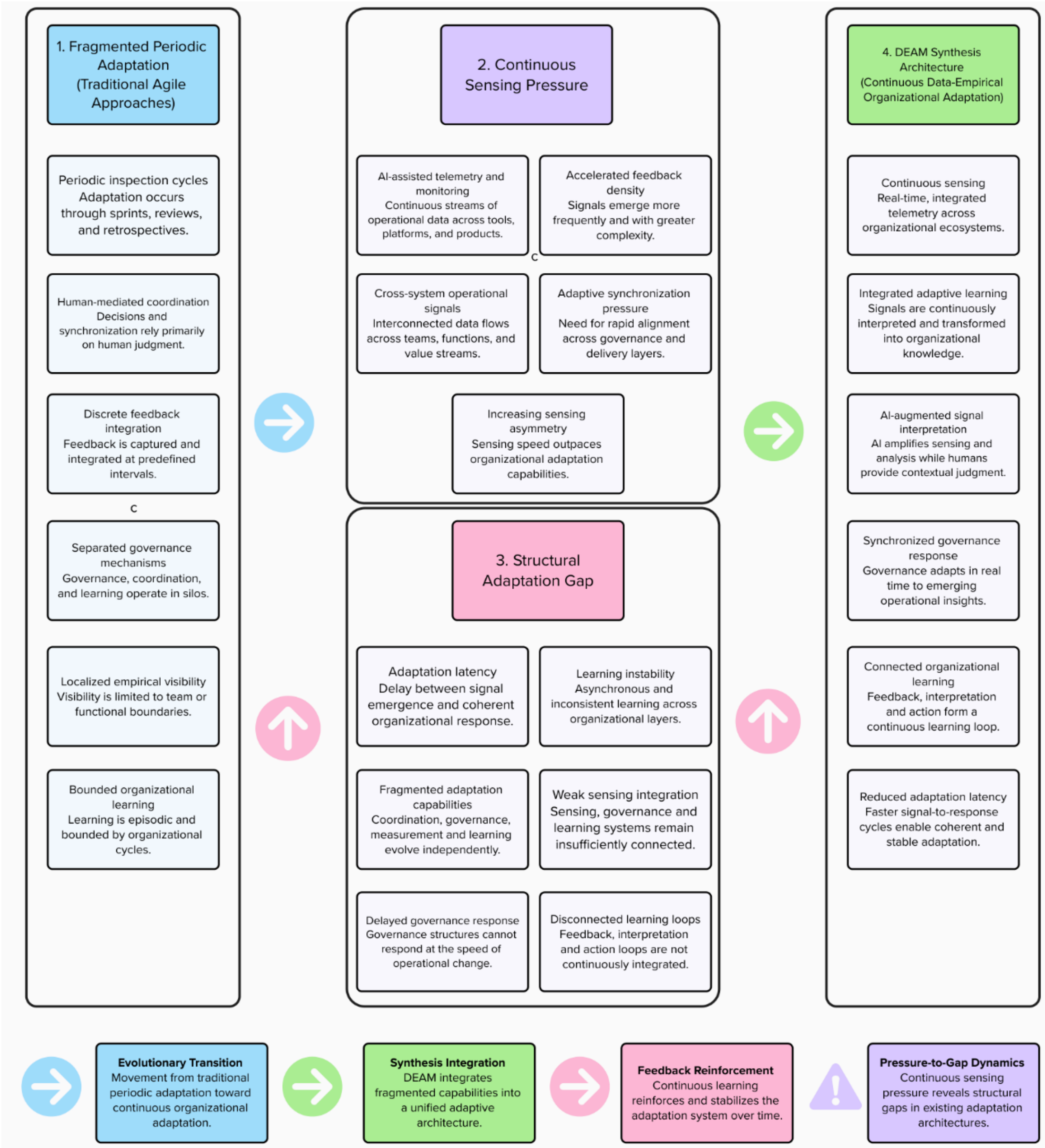

Figure 1. Transition from Fragmented Periodic Adaptation to Continuous Data-Empirical Organizational Adaptation

Source: developed by the Authors

Conclusions. The study analyzed structural adaptation limitations of contemporary Agile transformation models under AI-augmented organizational conditions. The comparative analysis demonstrated that existing Agile approaches evolved through progressive specialization of adaptation capabilities related to coordination, governance, maturity progression and empirical measurement.

At the same time, these mechanisms remain structurally fragmented under conditions of continuous sensing and accelerated operational feedback. Within this context, the paper introduced the concept of adaptation capability fragmentation describing the structural separation of sensing, governance, coordination, measurement and organizational learning mechanisms across Agile transformation models.

The study further positioned DEAM as a synthesis architecture for continuous organizational adaptation integrating operational sensing, adaptive feedback loops and data-empirical organizational learning into coherent adaptive systems.

The scientific novelty of the study lies in reframing Agile transformation as a systemic organizational adaptation architecture problem rather than primarily a framework implementation challenge.

Future research should focus on empirical operationalization and longitudinal validation of adaptation capability fragmentation, adaptation latency and continuous organizational learning dynamics within AI-augmented delivery ecosystems. Particular attention should be devoted to development of measurable adaptation indicators, event-based organizational analysis and comparative validation across multi-team Agile environments.

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