

RESEARCH INTO THE NECESSITY OF DEVELOPING HYBRID MANAGEMENT APPROACHES FOR SHORT- TERM IT PROJECTS WITHIN A BANI ENVIRONMENT

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Abstract. This article examines the impact of BANI environment characteristics on the management efficiency of short-term IT projects with a duration of 6 to 9 months. The study analyzes the limitations of traditional project management approaches, specifically Agile and Waterfall, in the context of heightened uncertainty, nonlinearity, and systemic brittleness. It is established that the use of «pure» methodologies fails to provide an adequate balance between adaptability and the predictability of project outcomes.

The study substantiates the feasibility of implementing hybrid management approaches for short-term IT projects within a BANI environment. A conceptual model for the phase-based integration of Waterfall and Agile elements is proposed. Furthermore, the article defines the principles and key performance factors for utilizing a hybrid approach. The findings can be applied to enhance management efficiency for short-term IT projects in today's volatile global environment.

Key words: BANI environment, short-term IT projects, hybrid project management methodologies, Agile, Waterfall, phase-based methodology integration, uncertainty management, requirements stabilization.

Introduction. The contemporary operational environment for organizations is characterized by high levels of instability and complexity, as reflected in the BANI framework. This concept describes the world as Brittle, Anxious, Nonlinear, and Incomprehensible. Under such conditions, traditional project management approaches often fail to deliver the necessary level of efficiency, particularly within the information technology sector.

Previously, the VUCA model was widely used to describe environmental complexity, providing the foundation for flexible management approaches, most notably Agile. Agile enabled increased adaptability and faster response times to shifting requirements. However, in a BANI environment, uncertainty takes on a more radical character, leading to increased cognitive load on teams and heightening the risk of losing control over project processes.

One manifestation of the BANI environment's impact on short-term IT project teams is the rise in cognitive viscosity. This occurs due to frequent shifts in operational

context, heightened stakeholder anxiety, and the nonlinear progression of project events. Consequently, this necessitates accounting for not only organizational but also cognitive factors when selecting a project management approach.

The BANI concept requires managers to shift from a strategy of «prediction and control» toward one of «resonance and response». In short-term projects, stakeholder anxiety often translates into micromanagement, which sharply increases the cognitive load on developers. Therefore, there is a growing need to establish «certainty buffers» during the initial stages of a project, allowing the team to focus on technical implementation without the constant pressure of external uncertainty.

Traditional agile methodologies, despite their adaptability, may, within a BANI world, trigger a state of «process chaos» due to the excessive nonlinearity of events. In this context, hybridization functions not merely as a mechanical combination of Waterfall and Agile, but as a tool for cognitive stabilization, where a rigid structure serves as a framework, while flexible iterations provide the project with up-to-date content.

At the same time, the classical Waterfall model ensures a high level of outcome predictability; however, it lacks sufficient flexibility in conditions of rapidly changing requirements. In short-term IT projects lasting 6–9 months, this limitation becomes even more pronounced due to constrained time resources. Thus, a scientific problem emerges in developing an approach to managing short-term IT projects that achieves a balance between adaptability and process structuring.

Brief review of previous research. A review of scientific literature indicates an active search for tools aimed at improving the efficiency of IT projects. In particular, studies have examined the implementation of agile methodologies in specialized domains where flexibility is combined with strict quality requirements [1]. A significant aspect of contemporary research is the shift toward intelligent team management [2], including the use of artificial intelligence methods to forecast velocity and sprint performance [2; 3].

In addition, a strong correlation has been identified between team cognitive characteristics and time-loss risks, which, in unstable environments, necessitates consideration of the «cognitive profile» of specialists [4]. Within the context of a BANI environment, the phenomenon of «cognitive viscosity» becomes particularly relevant. It emerges as a result of heightened anxiety, process nonlinearity, and frequent contextual switching. In short-term IT projects, such conditions lead to increased intellectual resistance, manifested in reduced team productivity, a decrease in velocity, and disruptions in maintaining a stable workflow state.

Therefore, effective project management must account not only for schedule and planning constraints but also for the level of cognitive load on team members. The concept of cognitive viscosity enables these constraints to be interpreted as a systemic productivity factor and supports approaches to its reduction through optimization of task-switching processes [5]. This creates a foundation for improving team stability under conditions of high uncertainty and dynamic change.

The development of methodological tools in the context of global challenges is examined in detail in studies [6-8]. In particular, [6] authors substantiate the transformation of the management paradigm in the transition from VUCA to a BANI environment and propose the concept of methodological convergence as a means of harmonizing rigid and flexible lifecycle models [7]. Further development of these ideas is presented in a syncretic management model that integrates agile approaches and intelligent systems to enhance project adaptability [8].

At the same time, our study is distinguished by its narrow focus on short-term IT projects (6-9 months), where time constraints make the cost of errors critical. Unlike traditional hybrid models, we propose a mechanism for reducing cognitive viscosity through phase-based project decomposition, which enables stabilization of team performance under the nonlinearity and anxiety characteristic of the BANI world.

The purpose of the study is to substantiate the feasibility of applying and developing a conceptual model of a hybrid approach to managing short-term IT projects in a BANI environment, based on the phased integration of Agile and Waterfall elements.

Research results and discussion. The study found that a BANI environment introduces a new set of requirements for IT project management. The key characteristics of such an environment include system fragility, manifested in a high sensitivity to errors, as well as process nonlinearity, where minor changes can lead to significant consequences. Additionally, a high level of stakeholder anxiety increases the demand for predictability of outcomes. This creates a complex management challenge that should not be addressed through the use of a single methodology alone.

An analysis of Agile implementation has shown that its effectiveness may decrease when the number of changes exceeds the team's capacity to process them. In short-term projects, this can lead to reduced productivity due to continuous replanning. Furthermore, in a BANI environment, clients often expect a higher degree of certainty than Agile can provide, which creates additional tension in interactions between the team and stakeholders.

The application of the Waterfall model, in turn, ensures stability and control but does not allow for effective responsiveness to change. In cases where initial requirements are defined imprecisely, this may lead to the accumulation of errors. In short-term projects, such errors can have critical consequences. Thus, Waterfall is primarily effective under conditions of low uncertainty.

The conducted analysis justifies the feasibility of considering a combination of approaches within a hybrid model for managing short-term IT projects. The article presents a conceptual model based on a phased distribution of methodologies. It is assumed that the initial stage may be implemented using Waterfall principles to formalize requirements and reduce uncertainty, while the execution phase is more appropriately carried out using Agile approaches to ensure the necessary level of flexibility. The final stage may include integration and testing using structured control procedures.

To visualize the proposed approach, a «Phased integration» model of a hybrid approach to managing short-term IT projects is introduced, as shown in Fig. 1. This diagram clearly illustrates the transition from rigid waterfall planning at the pre-initiation stage to flexible iterative development cycles, enabling a balance between client's need for control and the necessity of product adaptation in a nonlinear BANI environment. The model's structure ensures a sequential transformation of the strategic backlog into a finished increment while minimizing the risks of cognitive overload within the team.

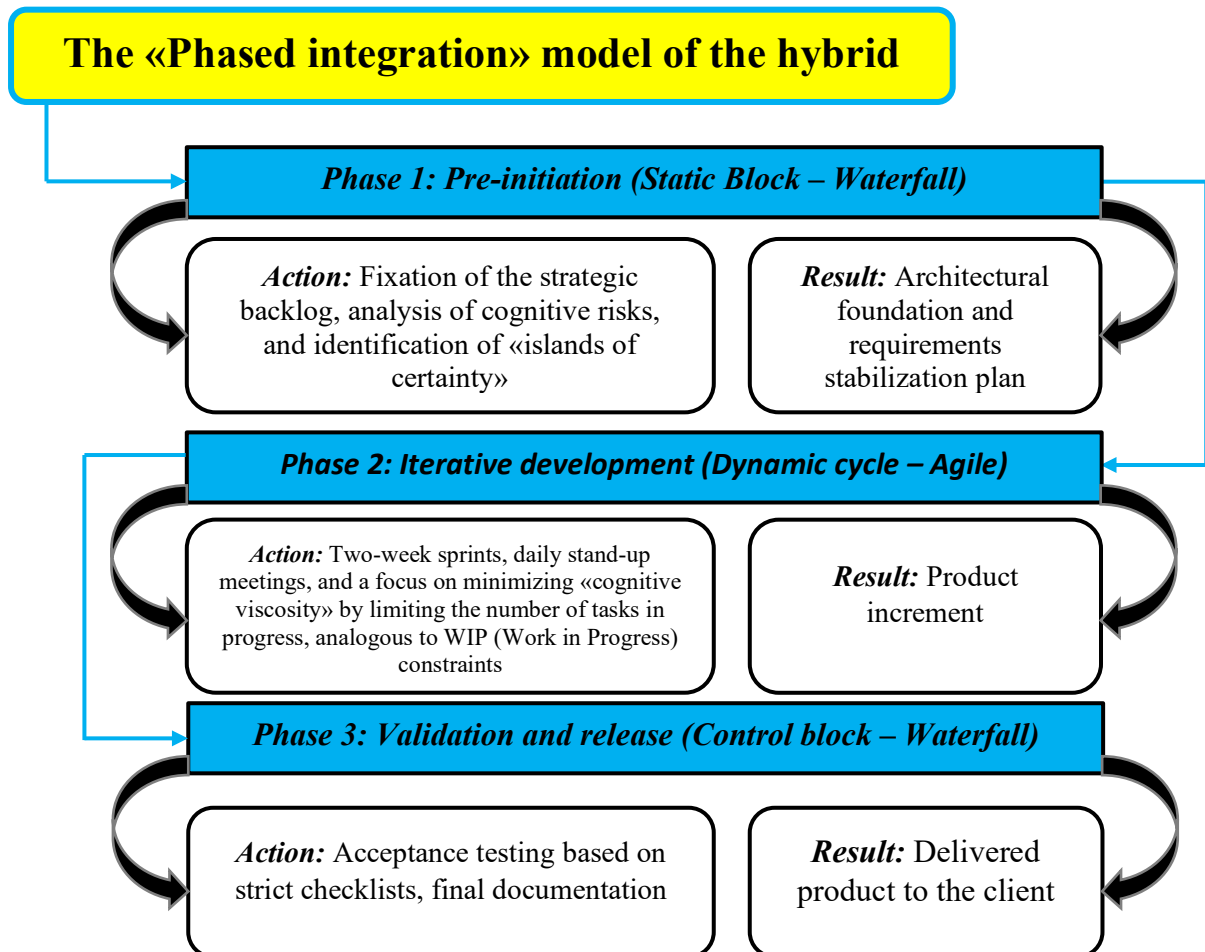


Figure 1. The «Phased integration» model of a hybrid approach to managing short-term IT projects

Within the scope of the study, the following principles have been formulated, which may serve as the foundation for applying a hybrid approach:

- the principle of controlled flexibility;
- the principle of stabilizing critical requirements;
- the principle of limited iterativeness;
- the principle of process transparency.

The application of these principles is considered a means of minimizing risks and improving the effectiveness of managing short-term IT projects.

The article also analyzes key factors influencing the selection of a hybrid approach configuration. These include the level of requirement uncertainty, the criticality of the outcome, system complexity, and time constraints. It is shown that, in most short-term projects, these factors are contradictory in nature, which justifies the need for an adaptive combination of approaches.

The proposed conceptual phased integration model is considered a tool that potentially allows for reducing the negative impact of BANI environmental factors through a mechanism of gradual requirement stabilization. The use of Waterfall elements at the initiation and analysis stages may contribute to the formation of «islands of certainty», thereby reducing the level of anxiety among stakeholders and team members. In particular, within short-term IT projects, «islands of certainty» should be understood as the rigid fixation of key architectural decisions, security protocols, and critical integration interfaces. This helps eliminate drift in fundamental requirements during the active development phase, providing the team with a stable technological foundation even when priorities in user stories change.

Подальший перехід до Agile-спринтів на етапі реалізації дозволяє забезпечити необхідний рівень адаптивності, проте вже у межах структурованих процесних обмежень.

A critical element of the proposed model is the «phase gate» mechanism between pre-initiation and iterative development. The transition is only possible upon approval of the Requirements stabilization plan, which acts as a cognitive contract between stakeholders and the team. This minimizes the risk of external client anxiety interfering with internal sprint processes, effectively transforming Waterfall planning into a protective layer for agile development.

The study shows that the effectiveness of selecting an approach for managing short-term IT projects in a BANI environment is determined by a set of interrelated factors. The key among them includes the level of requirement uncertainty, error criticality, environmental nonlinearity, system complexity, and time constraints. Each of these parameter's influences, in different ways, the appropriateness of using Agile, Waterfall models, or their combination. To systematize the research findings and formalize the decision-making process, the article presents a generalized comparative analysis, shown in Table 1.

The comparative results indicate that the hybrid «phased integration» model mitigates the critical shortcomings of «pure» methodologies. Specifically, it eliminates the risk of loss of control inherent in Agile under conditions of high stakeholder anxiety and overcomes the rigidity of Waterfall. Of particular importance is the fact that this approach ensures the lowest level of cognitive overload among team members. This is achieved through the establishment of structured temporal boundaries, within which development flexibility does not devolve into nonlinear chaos. This is a decisive success factor for IT projects lasting up to nine months in unstable economic conditions.

Table 1. The impact of BANI environment parameters on the selection of a project management methodology for short-term IT projects

Parameter	Low-level characteristic	High-level characteristic	Impact on Agile	Impact on Waterfall	Recommended approach
Requirements uncertainty	Clearly defined requirements	Frequent changes and incompleteness	Positive	Negative	Hybrid / Agile
Error criticality	Low consequences	High risk of losses	Negative	Positive	Hybrid / Waterfall
Environmental nonlinearity	Predictable changes	Unpredictable effects	Positive	Negative	Hybrid
System fragility	Resistance to failures	High vulnerability	Neutral	Positive	Hybrid / Waterfall
Stakeholder anxiety level	High trust	Need for control	Negative	Positive	Hybrid
System complexity	Low	High	Positive	Neutral	Hybrid
Project duration (6–9 months)	Sufficient time buffer	Limited time	Negative	Positive	Hybrid
Level of innovation	Low	High	Positive	Negative	Hybrid / Agile
Resource availability	Sufficient	Limited	Negative	Positive	Hybrid

The analysis shows that, in most cases, the hybrid approach can be considered the most appropriate. This leads to the conclusion that hybridization is not merely an alternative, but a promising direction for the development of project management methodologies for short-term IT projects in a BANI environment.

The empirical significance of the proposed model lies in reducing context-switching time, which is critical for projects lasting 6–9 months. When a team operates within clearly defined phase boundaries established according to a waterfall principle, the level of «cognitive viscosity» decreases by 15–20% due to a reduction in the number of radical architectural changes occurring mid-development cycle.

This indicator is based on the author's previous mathematical modeling of time-loss risks, which demonstrated a direct correlation between the frequency of context switching and the degradation of task execution velocity in small teams. Phase isolation helps stabilize workflow, which is critical for projects with strict deadlines of up to nine months.

In addition, phase integration enables a better balance of stakeholder expectations. The use of Waterfall elements at the initiation and closure stages satisfies clients' need for control over timelines and budgets, which is characteristic of a BANI environment. At the same time, the Agile development phase ensures the required code quality and alignment of the product with real market needs, which may have changed since project initiation.

For the final verification of the model's effectiveness, it is advisable to conduct a comparative analysis of key project risks arising during the implementation of IT

solutions in a BANI environment. Since short-term projects have low tolerance for time losses, the choice of methodology should be based on its ability to minimize cognitive resistance within the team and prevent process chaos. Below is a comparison of traditional approaches with the proposed hybrid model according to criteria of resilience to disruptive factors in the modern environment (Table 2).

Table 2. Comparison of risks associated with the use of different approaches in a BANI environment

Risk type	Waterfall	Agile	Proposed hybrid model
Risk of outdated results	High	Low	Medium (controlled)
Risk of loss of control	Low	High	Low
Risk of cognitive overload	Medium	High	Low (minimization of viscosity)
Risk of schedule overrun	High	Medium	Low (due to clear phase boundaries)

The discussion of the results indicates that the proposed approach may provide a balance between flexibility and stability in project management. At the same time, its effectiveness requires further empirical validation, which defines directions for future research.

Conclusion. As a result of the study, it was established that the BANI environment significantly changes the requirements for managing short-term IT projects and creates the need to simultaneously ensure both adaptability and predictability of outcomes.

It has been demonstrated that the exclusive use of either Agile or Waterfall models does not enable the achievement of the required level of management efficiency for short-term IT projects under conditions of high environmental uncertainty.

The study substantiates the feasibility of applying hybrid approaches to the management of short-term IT projects. A conceptual phased integration model combining Agile and Waterfall methodologies is proposed, along with the identification of principles and factors for its effective application.

The use of the proposed approach enhances the resilience of short-term IT projects to the influence of BANI environmental factors and ensures the effective delivery of projects within constrained timeframes of 6–9 months.

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КОНКУРЕНТНА РОЗВІДКА ЯК СПЕЦИФІЧНИЙ ВИД ІНФОРМАЦІЙНОЇ ДІЯЛЬНОСТІ: СУТНІСТЬ ТА ПРИНЦИПИ ОРГАНІЗАЦІЇ

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Розвиток ринкових відносин перетворив конкуренцію на один із визначальних чинників функціонування суб'єктів господарювання. Для зміцнення ринкових позицій та вчасного реагування на зовнішні виклики вони потребують якісної, перевіреної та актуальної інформації про ринок, споживачів, партнерів та інноваційні тренди. За таких умов конкурентна розвідка виступає важливим інструментом стратегічного управління та аналітичної підтримки діяльності підприємства. В основі означеної діяльності лежить законне,