INNOVATIVE TECHNOLOGIES FOR PROJECT AND PROGRAM MANAGEMENT

Collective monograph
edited by I. Linde

European University Press
ISMA University of Applied Sciences
Riga (Latvia) 2025

LĒMUMU ATBALSTA SISTĒMAS PROJEKTU UN PROGRAMMU VADĪBĀ

Kolektīvas monogrāfija
I. Linde zinātniskajā redakcijā

Eiropas Universitāte Press
Informācijas sistēmu menedžmenta augstskola
Rīga (Latvija) 2025

DOI: https://doi.org/10.30837/MMP.2025
ISBN 978-9984-891-34-7

Innovative Technologies for Project and Program Management [Text]: Collective monograph edited by I. Linde. European University Press. Riga: ISMA, 2025. 266 p.

Reviewers:

Oleg Fedorovich – Dr. Sc. (Engineering), Professor, Head of Department of Computer Sciences and Information Technologies, National Aerospace University "Kharkiv Aviation Institute".

Heorhii Kuchuk – Dr. Sc. (Engineering), Professor, Professor of the Department of Computer Engineering and Programming, National Technical University "Kharkiv Polytechnic Institute".

Authors: Anishchenko A., Artomova A., Baryshevskyi A., Bazilevych K., Bulavin D., Cherkasov D., Chumachenko D., Chumachenko T., Danshyna S., Dobrytskyi D., Farionova T., Fedorovich O., Fedorovych V., Fonarova T., Gubka O., Khrustalova S., Kosenko N., Kosenko V., Kobylkin D., Kovalchuk O., Kozyr S., Kritskiy D., Kuznetsova Yu., Leshenko Yu., Malieiev L., Malyeyeva O., Meniailov Ie., Moiseienko A., Molokanova V., Neronov S., Oriekhov O., Parfeniuk Yu., Petrenko V., Plehov D., Plehova G., Podorozhko K., Popov A., Prohorov O., Sharonova N., Sopov Ie., Timofeyev V., Troshchyi D., Vyprytskyi A.

The monograph presents the achievements of Ukrainian scientists in the field of business management, use of economic and mathematical modeling, information technologies, management technologies and technical means in the field of functioning, development, and project management at enterprises.

The publication is recommended for professionals in the fields of economics, information technology, project and program management – for undergraduate and graduate students, as well as academics and teachers of higher education.

The articles are reproduced from the original authors, in the author's edition.

DOI: https://doi.org/10.30837/MMP.2025 ISBN 978-9984-891-34-7

CONTENT

DOI: https://doi.org/10.30837/MMP.2025.134

DIGITIZATION OF IT TEAM MANAGEMENT PROCESSES IN PROJECT MANAGEMENT: THE ROLE OF INFORMATION SYSTEMS AND ARTIFICIAL INTELLIGENCE

Kovalchuk O., Kobylkin D.

The monograph is devoted to the study of digitalization processes in IT team management within project and program management, with a focus on the role of information systems and artificial intelligence. The work examines the theoretical and methodological foundations of digitalization, the evolution of management approaches from classical models to Agile, DevOps, and scaled frameworks such as SAFe. Special attention is given to the analysis of project and HR management information systems, as well as the integration of AI in planning, productivity forecasting, resource optimization, and talent development processes. The authors present a team life cycle model, highlighting key characteristics, challenges, and managerial tasks at various stages of team formation, growth, stabilization, and renewal. Global and Ukrainian practical cases of digitalization and the implementation of innovative technologies are presented, demonstrating opportunities to enhance efficiency, transparency, and adaptability of teams in dynamic IT environments. The monograph may be useful for researchers, educators, IT team leaders, HR specialists, and managers aiming to apply modern digital approaches to improve organizational performance.

Current trends in society and the economy dictate the need to transform project management systems through the active implementation of digital technologies. Human resource management (HR) is becoming particularly important, as human capital remains a key factor in the success of any project. The use of information systems and artificial intelligence (AI) tools opens up new opportunities for optimizing the processes of selection, adaptation, motivation, and development of personnel within the implementation of projects and programs.

Adaptive Agile methodologies for managing IT projects and programs stimulate innovative team development and the search for new ideas. Masaaki Imai, a well-known theorist and consultant in the field of quality management, developed the KAIZEN concept. After World War II, management practices were introduced in organizations, including Toyota, and contributed to Japan’s economic miracle. This management system is aimed at the continuous improvement of processes in the organization and its functional aspects. This method belongs to the group of total quality management (TQM) systems. It can positively influence the processes of building an HR management system, as its principles encourage each team member to contribute to the achievement of project goals. A systematic approach

to the implementation of minor stages has a positive impact on the overall success of an IT project. KAIZEN practices also help to identify and eliminate project bottlenecks and losses, namely financial, time resources, and team member efforts.

KAIZEN is combined with Agile methodologies and the Scrum method. This allows for improved efficiency in team member communication. Daily sprints, retrospectives, and meetings facilitate problem solving, progress monitoring, rationalization proposals, and staff involvement in the implementation of IT projects and programs.

According to Isaac Adizes' theory, the life cycle of a team is characterized by certain stages that reflect the development of the team from the moment of its formation to the possible termination of its activities or restructuring. The first stage is the birth of the team, when its foundations are laid and the initial idea is formed. During this period, goals and initial resources are defined, and a leader and shared values are sought to determine the future direction of the team's work. The main tasks at this stage are to create the initial structure of the team and distribute key functions among its members. At the same time, the team faces a number of challenges, including uncertainty, lack of resources, and the need to establish clear roles.

The second stage is the accelerated growth or youth of the team, when the team rapidly increases in size and volume of work performed. At this stage, there is a need to professionalize participants, standardize processes, and implement a management system to avoid chaos. The main tasks are to build an effective organizational structure, distribute responsibilities, and adapt to new challenges that arise in the growth process. The youth stage is critical for consolidating the foundation of team effectiveness, as it is during this period that the standards of cooperation and interaction are established that will influence the further development of the team.

The third stage is stabilization or maturity, during which the team achieves stability and efficiency, and its activities become recognizable and predictable. The main tasks of this period are to maintain stability and efficiency while simultaneously searching for new avenues of development. The team must avoid the risk of complacency and loss of flexibility, which can lead to stagnation. Innovation and adaptation to changes in the external environment become key factors in maintaining the viability of the team at this stage.

The fourth stage is aging or renewal of the team, when productivity may decline and signs of internal degradation may appear. At this stage, there is a need for fundamental changes and a review of the team's goals and values. The main tasks are to update the structure, define a new mission, or, if reform is not possible,

prepare for the end of the team's activities. The aging stage demonstrates the importance of strategic management and the organization's ability to transform its teams to ensure long-term effectiveness.

Thus, the team life cycle model reflects the dynamics of its development, outlines the key characteristics of each stage, potential challenges, and necessary management decisions. Understanding these patterns allows managers to effectively plan resources, develop team members' competencies, and ensure long-term team effectiveness, which is especially relevant for IT teams working in project and program management, where the speed of change and complexity of tasks are increasing significantly. The team life cycle according to Adizes is a dynamic process where each team must be aware of its current position and actively work to overcome the challenges of each stage to achieve further success.

By applying Kaizen principles, HR managers can transform themselves from "administrators" to "facilitators" of change, helping teams to self-organize and continuously improve, thereby moving between the stages of the team-building life cycle. This not only increases efficiency but also strengthens corporate culture.

In today's digital transformation environment, organizations are faced with the need to simultaneously manage multiple teams working on complex information products and services. The growth in the scale of digital initiatives, the increase in the number of project participants, and the complexity of inter-team interactions require organizations to adopt new approaches to planning, coordination, and control. Traditional management methods no longer provide the necessary level of flexibility and speed of response to changes in the market environment. That is why digitalization, supported by the introduction of information systems and artificial intelligence tools, is becoming a determining factor in improving the efficiency of modern management processes.

Traditional Agile approaches, such as Scrum or Kanban, have proven themselves well within small teams, but their application becomes limited when scaled to the program or portfolio level. To address this issue, the Scaled Agile Framework (SAFe) was developed, which is a methodological approach to the coordinated management of a large number of teams within a single product vision.

Digitalization in team management is interpreted as the process of integrating digital technologies into all stages of a project or program lifecycle, which allows for the optimization of resource allocation, ensures process transparency, and improves decision-making quality. In the context of IT teams, the evolution of management methods is of particular importance: from classic hierarchical models to modern flexible methodologies such as Agile and DevOps. Agile methodology

has provided a new level of flexibility in managing small teams, but with the growth of organizations, there has been a need for methods capable of integrating the work of dozens or even hundreds of teams within a single strategic framework. The response to this challenge was the formation of scalable models, among which the Scaled Agile Framework (SAFe) occupies an important place.

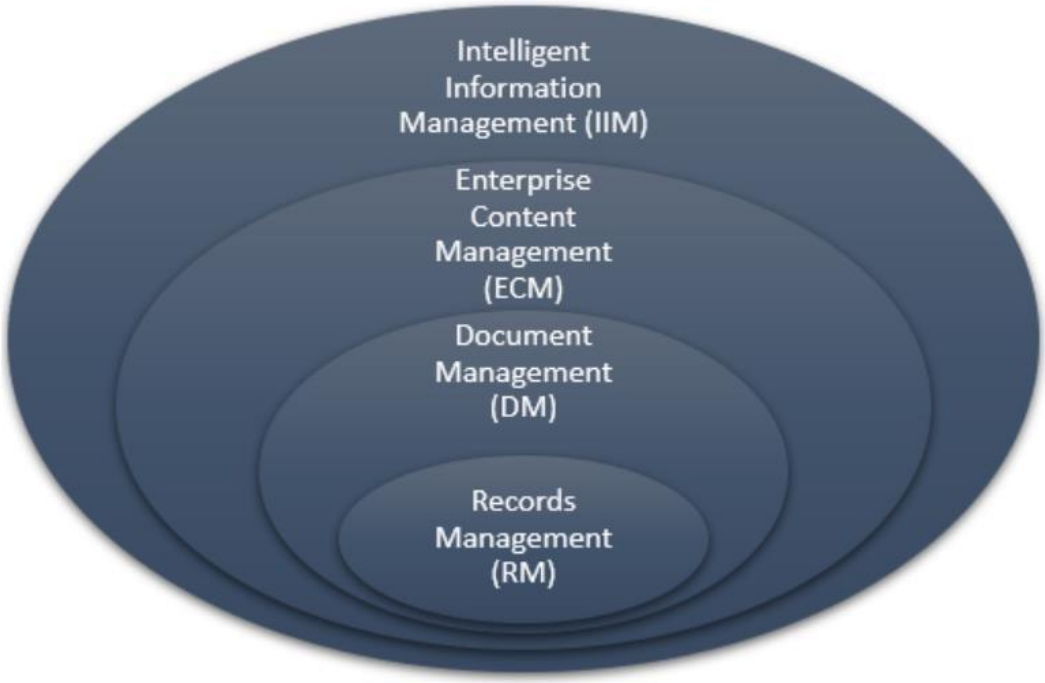

Fig. 1. Intelligent Information Management

SAFe combines Lean, Agile, and DevOps principles, allowing you to strike a balance between task flexibility and strategic organizational goals. The framework is based on the Agile Release Train (ART) concept – a long-term cross-functional structure that brings together several teams to work together on a product or program. ART ensures synchronization of iterations, integration of results, and increased transparency in the development process.

The SAFe structure provides for four levels of management:

• Team level – a separate team working according to Scrum or Kanban, ensuring the completion of tasks within sprints.

• Program level – coordination of several teams within the ART, allowing them to coordinate their work and jointly achieve intermediate results.

• Large Solution level – management of large systems that require the interaction of several programs. This level provides scalability and integration at the level of architecture and technological solutions.

• Portfolio level – a strategic level that combines projects and programs with common business goals, sets priorities, and allocates resources in accordance with the company's long-term strategy.

An important advantage of SAFe is its ability to ensure consistency between business and technical teams, which is particularly relevant for the IT sector. Thanks to SAFe, organizations can combine strategic planning with operational flexibility, minimize risks, and respond more quickly to changes in the market environment.

The digitization of HR processes involves the comprehensive use of information systems to collect, process, and analyze employee data. This reduces routine tasks and allows you to focus on strategic aspects of management. The use of specialized HRM systems is integrated with project management systems, allowing you to form optimal teams according to competencies and tasks.

The use of information systems within SAFe plays a key role. Project and program management systems (Jira Align, Rally Software, Microsoft Azure DevOps) allow you to visualize planning, track dependencies between teams, and automate reporting processes. In addition, the use of artificial intelligence tools in SAFe helps to improve the accuracy of risk forecasting, optimize resource planning, and ensure a data-driven approach to management.

Thus, SAFe is not only a methodology for scaled Agile, but also a comprehensive approach to managing large project portfolios, combining organizational strategy with flexible teamwork practices. Its implementation in IT team management ensures synchronization, transparency, and speed of management decision-making, which is critically important in today's digital environment.

Table 1.

Global cases and the Ukrainian context: digital transformations

Category	Case / Example	Focused on
World SAFe	Toptal: Telecom Serbia	Training, team coordination, Agile Release Train
World SAFe	Toptal: financial company	WSJF, prioritization, synchronization implementation
Ukrainian case studies	Air Alert, Diia, Prozorro.Sale	Agile MVP, digital services, e-government, transparency
Ukrainian case studies	AI-проєкти (Noty.ai, Signy)	Task automation, AI assistants, SaaS

SAFe combines Lean, Agile, and DevOps principles, providing organizations with a structured model for managing large programs and portfolios. Its distinctive

feature is a multi-level management structure that covers the team, program, large solution, and portfolio levels. At the team level, SAFe involves working in Scrum or Kanban format; at the program level, it involves coordinating multiple teams through Agile Release Train; at the large solution level, it focuses on integrating complex systems; and at the portfolio level, it combines projects with long-term business goals. Thanks to this, SAFe ensures synchronization between the organization's strategic priorities and the operational activities of teams, which is especially important for the IT sector.

Information systems are an important element of digitalization management. They serve as a basic tool for organizing teamwork, coordinating tasks, and managing resources. Among the most common systems are Jira, Trello, Asana, Monday.com, Microsoft Project, and ClickUp, which provide task management, progress tracking, integration with third-party tools, and automation of some processes. More complex solutions, such as Jira Align or Rally Software, allow organizations to work according to SAFe principles and coordinate a large number of teams within a single program. Information systems digitize key management functions – planning, monitoring, control, and reporting – enabling managers to respond more quickly and accurately to changes in the external and internal environment. To eliminate IT project "losses", successful organizations use digital services to automate HR processes: recruiting, onboarding, talent development, and retention. Artificial intelligence is beginning to play a special role in modern team management. Artificial intelligence in human resource management is used for:

- analyzing large amounts of data about candidates and employees;
- predicting productivity and staff turnover risks;
- creating individual staff development trajectories;
- supporting management decision-making.

In project management, this allows for more accurate planning, shorter task completion times, and reduced risks associated with inefficient use of human capital. Its integration into digital management systems allows for the automation of a significant number of routine tasks: resource allocation, priority setting, task completion time forecasting, risk identification, and team performance analysis. Machine learning algorithms provide deeper analysis of large data sets and offer recommendations for decision-making based on predictive analytics. In the context of IT team management, this means the ability to proactively identify bottlenecks, timely adjust team workloads, and optimize communications. At the same time, the use of AI requires attention to issues of ethics, data protection, and preventing excessive reliance on algorithms in the strategic decision-making process.

There are numerous examples of successful application of SAFe and information systems in combination with AI in global practice. For example, international corporations such as Intel, AstraZeneca, Royal Philips, and Capital One demonstrate the effectiveness of scalable Agile approaches in coordinating the work of thousands of employees. Individual studies show that thanks to SAFe, companies reduce time to market, improve alignment between business strategies and technical solutions, and increase transparency for customers. In the financial and telecommunications sectors, SAFe has solved the problem of inter-team fragmentation by introducing mechanisms for synchronizing and prioritizing tasks using the WSJF model.

Ukraine also has examples of large-scale digitalization of government, which, although not always directly related to SAFe, demonstrate the effectiveness of Agile and AI in large projects. In particular, the Diya platform has become a symbol of digital transformation in public administration and was implemented according to the principles of MVP and rapid scaling. The Air Alert system, developed during military operations, demonstrated the capabilities of rapid iterative development and integration of user needs in the shortest possible time. Prozorro.Sale showed how digital tools can ensure transparency and efficiency in the management of state assets. These examples show that the digitization of management can be successfully applied not only in the commercial sector but also in public administration, opening up new opportunities for the use of information systems and artificial intelligence.

In today's digital world, information systems and artificial intelligence are becoming critical tools for human resource management, especially in the IT sector, where the speed of change and complexity of tasks require teams to be highly adaptable. Modern HR systems allow for the automation of a wide range of processes that were previously performed manually, including recruitment, onboarding of new employees, career planning, performance evaluation, and knowledge management. Integrating these systems into project and program management provides more accurate control over resources, effective task distribution, and optimization of teamwork. Modern HR information systems such as SAP SuccessFactors, Workday, Oracle HCM Cloud, BambooHR, and Personio allow you to collect and analyze large amounts of employee data. These platforms provide centralized personnel management, KPI tracking, performance monitoring, and competency development planning in line with the organization's strategy. Thanks to such systems, managers can assess team performance in real time, identify bottlenecks in task execution, and

make informed management decisions, which significantly increases the team's adaptability at all stages of its life cycle.

Artificial intelligence in HR opens up new opportunities for automating decision-making processes. Machine learning algorithms allow you to predict the effectiveness of candidates at the recruitment stage by analyzing both professional and behavioral characteristics. AI assistants help automate the onboarding process for new employees by selecting individual training plans and assessing progress in mastering the necessary skills. In addition, intelligent systems analyze team dynamics, identify potential conflicts, and provide recommendations for optimal task distribution, which helps increase productivity and employee satisfaction. In project and program management, the integration of HR information systems and AI contributes to more effective human resource management in large-scale IT projects. For example, automated systems can track team members' workloads, predict task completion times based on historical data, and suggest optimal resource allocation scenarios. This is especially important during periods of rapid growth and team stabilization, when the number of tasks and participants increases and the risk of overload and loss of efficiency becomes critical.

The use of AI in HR also promotes the development of a personalized approach to talent management. Intelligent platforms are capable of creating individual development plans for employees, identifying training and upskilling needs, and assessing the alignment of current competencies with the organization's strategic goals. This ensures the continuous development of the team, maintains its motivation, and prevents the risk of stagnation, which is characteristic of the maturity stages of the team life cycle. Special attention should be paid to data analytics in HR, which allows managers to obtain data-driven insights into team performance. Based on large amounts of information about productivity, participant interaction, and project results, AI systems can generate forecasts of potential productivity declines, suggest measures to optimize processes, or even identify hidden talents among employees. This approach not only helps maintain high team performance but also contributes to the strategic development of the organization as a whole.

Thus, the introduction of information systems and artificial intelligence in HR allows for the creation of a new generation of human resource management systems, where the automation of routine processes is combined with deep analytics and the individualization of management decisions. For IT teams working in project and program management, this means increased adaptability, efficiency, and innovation at all stages of the life cycle, from the team's inception to its stabilization and renewal. The integration of HR information systems and AI also opens up

prospects for further scientific research, in particular regarding the evaluation of the effectiveness of algorithms in predicting team performance, studying the impact of automated decisions on employee motivation, and developing ethical standards for the use of artificial intelligence in human resource management. This allows for the combination of strategic planning and digital technologies, creating a comprehensive approach to managing IT teams in today's environment.

Thus, the digitization of IT team management processes in project and program management is a complex phenomenon that encompasses methodological, technological, and organizational aspects. It is based on a combination of modern approaches, such as Agile, DevOps, and SAFe, with the use of powerful information systems and artificial intelligence tools. This allows organizations to increase their adaptability to change, reduce project implementation time, improve communication between teams, and ensure a higher level of transparency in management processes. Prospects for further research lie in studying the practical aspects of integrating AI into program management systems, developing ethical standards for the use of algorithms in management, and adapting scalable approaches to the specifics of the Ukrainian IT sector. Therefore, the digitization of HR processes and the use of artificial intelligence are becoming key factors in improving project management efficiency. The integration of information systems into project management contributes to the creation of flexible teams, the optimization of management decisions, and the growth of organizations' competitiveness.

References

1. IT Management: Textbook: in 2 parts. Part 1 / O.V. Gorpinchenko, O.V. Zayarnuk, I.M. Sochynska-Sybirtseva [et al.]. Kropyvnytskyi: CNTU, 2024. – 218 p.
2. Balanovska T. I., Mikhailichenko M. V., Troyan A. V. Modern technologies of personnel management: textbook. Kyiv: FOP Yamchynskyi O. V., 2020. 466 p.
3. N. Kovalchuk, O. Zachko, O. Kovalchuk and D. Kobylkin, «Project Management of the Information System for the Selection of Project Teams,» 2023 IEEE 12th International Conference on Intelligent Data Acquisition and Advanced Computing Systems: Technology and Applications (IDAACS), Dortmund, Germany, 2023, pp. 1054–1057, DOI: 10.1109/IDAACS58523.2023.10348656
4. Agres, O., Sodoma, R., Ilchyshyn, I., Kovalchuk, O., & Shmatkovska, T. (2025). Regional development project management: financial aspect. Technology Audit and Production Reserves, 3(4(83)), 87–92. https://doi.org/10.15587/2706-5448.2025.330027
5. Kovalchuk Oleh, Kobylkin Dmytro and Zachko Oleh: Graphodynamic modeling for a multi-agent support system for personnel decision-making in the field of human safety. Proceedings of the 4th International Workshop IT Project Management (ITPM 2023). Warsaw 2023. P. 149–159.

Scientific publication

INNOVATIVE TECHNOLOGIES FOR PROJECT AND PROGRAM MANAGEMENT

Collective monograph
edited by I. Linde

LĒMUMU ATBALSTA SISTĒMAS PROJEKTU UN PROGRAMMU VADĪBĀ

Kolektīvas monogrāfija
I. Linde zinātniskajā redakcijā

Parakstīts iespiešanai 2025-26-09. Reģ. № 07-10.
Formats 60x84/16 Ofsets. Ofseta papīrs.
14,8 uzsk.izd.l Metiens 300 eks. Pasūt. № 144.
Tipogrāfija «Landmark» SIA, Ūnijas ieja 8, k.8, Rīga, LV-1084.
Reģistrācijas apliecības numurs: 40003052610. Dibināts: 28.12.1991.