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THE ARCHITECTURE OF DYNAMIC INTEGRATED INTELLIGENCE MODEL FOR MANAGING INNOVATION PROJECTS

Abstract. Existing Intelligence Models for managing innovative projects and programs have been explored. The competency-based approach is considered the basis for building a Dynamic Integrated Intelligence Model for managing innovative projects and programs. The proposed architecture of two groups of competence at a high level and five groups of Competencies lower level of the Dynamic Integrated Intelligence Model for Managing Innovation Projects. The Dynamic Integrated Intelligence model has two groups of high levels – Fluid intelligence and Crystallized intelligence. The lower-level model is presented by seven groups of interrelated competencies: strategic, managerial, emotional, social, cognitive, business, and technical. Each group of competencies of the Dynamic Integrated Intelligence Model is defined. The Dynamic Integrated Intelligence Model (DIIM) is a framework that helps individuals and organizations develop and enhance their ability to adapt to change and uncertainty. It is based on the idea that intelligence is not a fixed trait but rather a dynamic set of skills and abilities that can be developed and improved over time. By developing and enhancing these four components of intelligence, individuals, and organizations can become more adaptable, innovative, and resilient in the face of change and uncertainty. The dynamic integrated intelligence model can be applied in an Agile environment to enhance the cognitive and social-emotional skills of Agile team members. Applying the dynamic integrated intelligence model in an Agile environment can lead to better teamwork, enhanced problem-solving abilities, and improved project outcomes. The organization competence-based IPMA Delta model was used to assess the project team's competence level. As an example of the application, the Dynamic Integrated Intelligence Model to the implementation of the double degree project of the Kyiv National University of Civil Engineering and Architecture and the Dortmund University of Applied Sciences.

Keywords: architecture, intelligence model, innovation projects, managing, dynamic

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Introduction

Modern methodologies for managing innovative projects and programs, as a rule, are of a process nature, which determines the actions of a project manager within the framework of the proposed approach [1]. At the same time, there is practically no intellectual saturation of models and management methods. Technological breakthroughs associated with the massive use of neural networks and models such as ChatGPT by Open AI define trends in the development of innovative project and program management methodologies based on intelligent creative templates. Google will respond with a similar and superior system that was originally trained on the Internet. For the development of artificial intelligence at such a tipping point, a new framework is needed that will integrate existing models and approaches from a global perspective. First of all, such a model is needed to clearly define the scope and its place in a dynamic intellectual space.

The purpose of the paper is to present the architecture of the Dynamic Integrated Intelligence Model for managing innovation projects.

Dynamic Integrated Intelligence Model architecture

The modern world is in a state of turbulence, on the one hand, and dynamic development of innovative technologies, on the other. This contradictory situation was formed during Russia's war against Ukraine and the Western coalition. Modelling such complex systems, taking into account the innovative orientation, requires the development of dynamic integrated intelligent models. Therefore, the development of a dynamic integrated intelligent model is timely [2]. Such a model should cover all directions of intelligent models and have a dynamic component for simulating applications in management processes. The model should have an architecture that encompasses the innovative process of creating project products with the accumulation of knowledge and the management of emotional, social, technical, cognitive, and managerial intelligence.

Let's consider two elements of intelligence: fluid intelligence and crystallized intelligence.

Fluid intelligence determines the dynamics of the application of the integrated model. Crystallized intelligence is an umbrella for the basic 7D integrated intelligence model. The architecture of the proposed dynamic model is shown in Fig. 1.

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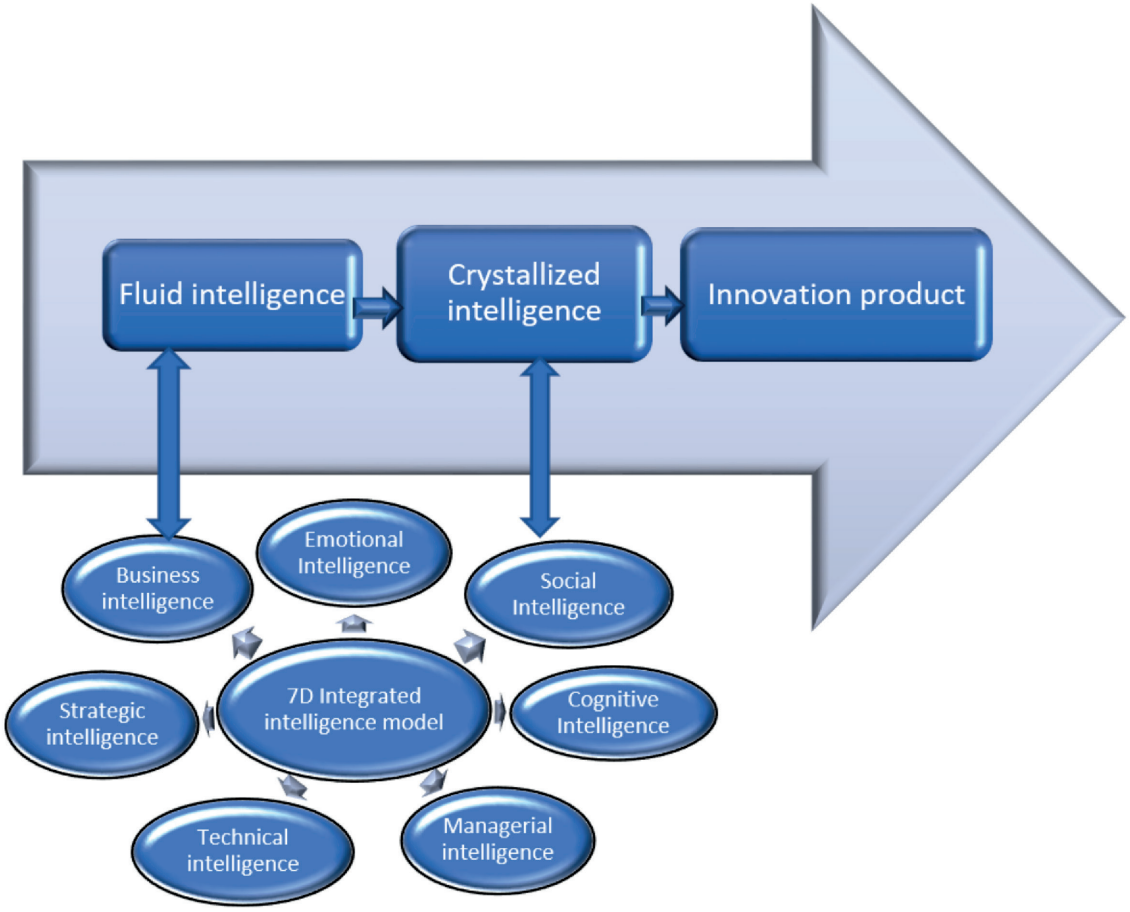

Figure 1. Architecture of Dynamic Integrated Intelligence Model for innovation project management

The Dynamic Integrated Intelligence Model (DIIM) is a framework that helps individuals and organizations develop and enhance their ability to adapt to change and uncertainty. It is based on the idea that intelligence is not a fixed trait, but rather a dynamic set of skills and abilities that can be developed and improved over time. By developing and enhancing these four components of intelligence, individuals and organizations can become more adaptable, innovative, and resilient in the face of change and uncertainty. The DIIM emphasizes the importance of continuous learning and development and encourages individuals and organizations to embrace change as an opportunity for growth and development [3,4]. As a result of the application, DIIM will create an innovative product.

Fluid intelligence refers to the ability to think abstractly, reason logically, and solve problems in new and unfamiliar situations. It involves the ability to identify patterns, make connections between seemingly unrelated information, and use reasoning and problem-solving skills to find solutions to complex problems. While fluid intelligence tends to decline with age, research has shown that it can be improved through training and practice. This suggests that the brain can adapt and change throughout life, and that cognitive abilities can be developed and enhanced through intentional effort and training. Fluid intelligence is often contrasted with crystallized intelligence, which refers to knowledge and skills that are acquired through learning and experience, such as vocabulary, general knowledge, and expertise in a particular domain. Unlike crystallized intelligence, fluid intelligence is considered to be more innate and less influenced by experience and education. It is thought to be closely related to cognitive processes that are involved in working memory, attention, and cognitive flexibility. Fluid intelligence is important

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for a wide range of cognitive tasks, including problem-solving, decision-making, and learning. It is also believed to be a key factor in intellectual creativity.

Crystallized intelligence refers to the accumulation of knowledge, skills, and expertise that a person has acquired through education, training, and experience. It involves the ability to use previously acquired knowledge and skills to solve problems and make decisions [6,7]. Crystallized intelligence is often contrasted with fluid intelligence, which refers to the ability to think abstractly, solve novel problems, and adapt to new situations. While fluid intelligence is largely innate and tends to decline with age, crystallized intelligence is largely based on experience and learning, and tends to increase or remain stable with age. Crystallized intelligence is important for many cognitive tasks, such as reading comprehension, vocabulary, and general knowledge. It also plays a role in professional expertise and career success, as it allows individuals to apply their knowledge and skills to complex work tasks. Crystallized intelligence can be improved through education, training, and learning new skills. Reading, taking courses, and engaging in on-the-job training are all ways to enhance crystallized intelligence. It is an important component of overall intelligence and can contribute to success [5].

The Basic 7D Integrated Intelligence model

The Basic Intelligence model consists of seven key components:

Strategic Intelligence. Strategic intelligence refers to the ability to gather, analyze, and interpret information to make informed decisions and develop effective strategies for achieving long-term goals. It involves a deep understanding of the competitive landscape, market trends, and industry dynamics, as well as the ability to anticipate and respond to changes and disruptions. [8, 9, 10].

Emotional Intelligence. This refers to the ability to recognize and manage one's own emotions, as well as the emotions of others. It involves developing empathy, building relationships, and communicating effectively [11].

Cultural Intelligence. This refers to the ability to understand and navigate different cultural contexts. It involves developing an awareness and appreciation of different cultural norms and values, as well as the ability to adapt to new cultural environments [12, 13].

Cognitive Intelligence. This refers to the ability to learn and acquire new knowledge and skills. It involves developing a growth mindset, seeking out new experiences and challenges, and continuously learning and improving [14].

Social intelligence refers to the ability to understand and navigate social situations, build relationships, and communicate effectively with others. It involves a combination of cognitive and emotional skills, including empathy, social awareness, and communication skills [15].

The business intelligence (BI) model is a framework or system that is used to analyze data and provide insights into business operations. It typically involves gathering data from various sources, transforming it into a usable format, and presenting it in a way that makes it easier to understand and use. BI models can take many forms, but they generally involve a combination of data analysis tools, data warehouses or data lakes, and visualization software. Some BI models also incorporate artificial intelligence (AI) or machine learning (ML) algorithms to help identify patterns and trends in the data. The goal of a BI model is to provide decision-makers with the information they need to make informed decisions about their business. This may include information about sales, marketing, operations, customer behaviour, financial performance, and more. By using a BI model, businesses can gain a better understanding of their operations, identify areas for improvement, and make data-driven decisions that can lead to increased efficiency, productivity, and profitability [16, 17].

Technical intelligence refers to the ability to understand and apply technical knowledge and skills in a particular field or industry. It involves the ability to analyze, evaluate, and apply

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technical information to solve problems, make decisions, and create new ideas and solutions. Individuals with technical intelligence typically have a strong understanding of scientific, engineering, or mathematical principles, and can apply this knowledge to real-world situations. They are often skilled in using various tools, software, and technologies to design, build, and test new products or systems. Technical intelligence is highly valued in many industries, including technology, engineering, manufacturing, and research and development. It is often a key factor in the success of innovative companies and projects, as it enables individuals to identify new opportunities and create solutions that can have a significant impact on the world [18,19].

Cognitive Intelligence model

Cognitive Intelligence models can take different forms depending on the specific theory or approach that they are based on. However, most intelligence models share some common elements or architecture, including. Cognitive Intelligence models provide a framework for understanding the different components and factors that contribute to intelligence, and for assessing and measuring intelligence in different contexts [20, 21]. While there is still much debate and controversy surrounding the nature and definition of intelligence, cognitive models have helped researchers and practitioners to better understand and study this complex and multifaceted construct. Let's look at key elements of the cognitive model.

Components or Factors. Cognitive Intelligence models typically identify different components or factors that contribute to overall intelligence. These factors may be specific abilities, such as verbal comprehension, spatial reasoning, or working memory, or they may be broader constructs, such as fluid intelligence, crystallized intelligence, or emotional intelligence.

Assessment Tools. Cognitive Intelligence models often rely on standardized assessments or tests to measure intelligence. These assessments may be designed to measure specific abilities or constructs, or they may be comprehensive measures of overall intelligence.

Developmental Trajectories. Cognitive Intelligence models describe how intelligence changes and develops over time. This may involve identifying different stages or periods of development, or it may involve describing how different abilities or constructs change across the lifespan.

Environmental Influences. Cognitive Intelligence models may also take into account the role of environmental influences, such as genetics, education, and culture, in shaping intelligence. Some models emphasize the importance of genetic factors, while others emphasize the role of environmental factors in shaping intelligence.

Practical Applications. Cognitive Intelligence models may have practical applications in a variety of fields, including education, psychology, and business. For example, cognitive models may be used to identify students who are at risk of falling behind academically, to assess job candidates' suitability for specific roles, or to inform interventions aimed at improving cognitive abilities.

Social intelligence models

Social intelligence enables individuals to perceive and understand social cues, such as body language, facial expressions, and tone of voice, and to use this information to interpret and respond appropriately to social situations. It also involves the ability to take another person's perspective and understand their thoughts, feelings, and motivations. Social intelligence is important for a wide range of social and professional contexts, including personal relationships, team collaboration, and leadership. It is particularly important in jobs that require a high degree of interpersonal interaction and communication, such as sales, customer service, and management.

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Research has shown that social intelligence is not only a key predictor of success in social and professional contexts but it can also be developed and improved through training and practice. This suggests that social intelligence is not a fixed trait, but rather a skill that can be cultivated and enhanced over time. Some strategies for developing social intelligence include improving active listening skills, practicing empathy, and seeking out opportunities for social interaction and communication.

Measuring tools and technics

Measuring strategic intelligence

Measuring strategic intelligence requires a holistic approach that considers multiple factors, including cognitive abilities, behavioural traits, and job performance.

By using a combination of assessment methods, organizations can gain a more comprehensive understanding of an individual's strategic intelligence and make better-informed decisions about hiring, development, and promotion. Measuring strategic intelligence can be a complex task, as it involves multiple cognitive and behavioural factors. Several approaches can be used to assess an individual's strategic intelligence.

Cognitive assessments: These tests evaluate an individual's ability to think critically, analyze complex information, and solve problems. Examples of cognitive assessments include IQ tests, aptitude tests, and critical thinking assessments.

Behavioural assessments. These tests evaluate an individual's behaviours and preferences and can provide insights into their decision-making style, communication skills, and leadership potential. Examples of behavioural assessments include personality tests, leadership assessments, and emotional intelligence assessments.

Work samples: These are assessments that require an individual to perform a task or complete a project that simulates real-world strategic decision-making. Work samples can include case studies, business simulations, and strategic planning exercises.

Performance evaluations: These assessments evaluate an individual's performance on the job, including their ability to make strategic decisions and achieve organizational goals. Performance evaluations can be conducted through self-assessments, peer evaluations, and supervisor evaluations.

Measuring cognitive intelligence

Measuring cognitive intelligence, also known as general intelligence or g-factor, typically involves the use of standardized tests, such as intelligence quotient (IQ) tests. These tests assess an individual's ability to reason, problem-solve, comprehend complex ideas, learn quickly, and adapt to new situations.

IQ tests generally consist of a series of questions or tasks that assess different cognitive abilities, such as verbal comprehension, spatial reasoning, working memory, and processing speed. The questions or tasks are designed to be objective and standardized, meaning that they are the same for all test-takers and are scored according to established norms.

IQ scores are typically reported on a scale where the average score is 100 and the standard deviation is 15. Scores below 70 are generally considered to be in the range of intellectual disability, while scores above 130 are considered to be in the range of giftedness.

However, it's important to note that IQ tests are not without controversy and limitations. Some critics argue that IQ tests are culturally biased or fail to capture important aspects of intelligence, such as creativity, emotional intelligence, or social intelligence. Additionally, IQ scores are not necessarily predictive of success in all domains of life and may not fully capture

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an individual's potential or abilities. Therefore, it's important to use IQ tests as just one tool for assessing cognitive intelligence and to interpret scores with caution and in conjunction with other measures and information.

Measuring emotional intelligence

Measuring emotional intelligence typically involves the use of self-report measures and/or behavioural observations. Measuring emotional intelligence requires a multi-faceted approach that incorporates a range of different methods and measures. Researchers and practitioners may choose to use one or more of these approaches, depending on their research questions, available resources, and desired outcomes.

Self-Report Measures. Self-report measures are questionnaires or surveys that ask individuals to report on their emotional abilities and behaviours. These measures typically assess different aspects of emotional intelligence, such as self-awareness, self-regulation, motivation, empathy, and social skills. Self-report measures may ask individuals to rate themselves on a scale from «strongly agree» to «strongly disagree», or to respond to specific scenarios or statements. While self-report measures have the advantage of being relatively easy to administer and can provide insight into an individual's self-perception of their emotional abilities, they are subject to biases such as social desirability bias, where individuals may respond in ways that make them look good rather than accurately reflecting their emotional intelligence.

Behavioural Observations. Behavioural observations involve directly observing an individual's emotional abilities and behaviours in real-world or simulated social situations. These observations may be conducted by trained assessors or peers and can provide insight into an individual's ability to perceive, express, and regulate their own emotions, as well as their ability to perceive and respond to the emotions of others. Behavioural observations can be time-consuming and resource-intensive, but they can provide rich and detailed information about an individual's emotional intelligence.

Performance Tasks. Performance tasks are assessments that require individuals to complete specific emotional tasks or scenarios, such as recognizing emotions from facial expressions, interpreting emotions from tone of voice, or managing emotions in social situations. These tasks can be used to assess different aspects of emotional intelligence, such as emotional perception, emotional expression, and emotional regulation. Performance tasks can be challenging to develop and administer, but they can provide objective and standardized measures of emotional intelligence.

Measuring technical intelligence

Measuring technical intelligence, also known as technical ability or technical skills, typically involves assessing an individual's knowledge, proficiency, and experience in a particular technical domain. Here are some common methods for measuring technical intelligence. Measuring technical intelligence requires a multi-faceted approach that incorporates a range of different methods and measures. Employers and educators may choose to use one or more of these approaches, depending on their goals, available resources, and desired outcomes.

Education and Training. Education and training are common indicators of technical intelligence. Formal education, such as degrees, certificates, or diplomas, can provide evidence of an individual's knowledge and competence in a particular technical field. Ongoing training and professional development can also indicate an individual's commitment to staying up to date with the latest technology trends and best practices.

Work Experience and Accomplishments. Work experience and accomplishments can provide evidence of an individual's technical intelligence. Resumes, job descriptions, and work

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portfolios can highlight an individual's technical skills, achievements, and contributions in a particular field. Employers may also provide references or testimonials that attest to an individual's technical abilities and performance.

Skills Assessments. Skills assessments are tests or evaluations that measure an individual's technical skills and knowledge. These assessments may involve written tests, practical exams, or simulations that assess an individual's ability to perform technical tasks, solve technical problems, or demonstrate technical knowledge. Technical certifications, such as those offered by professional organizations or vendors, may also provide evidence of an individual's technical intelligence.

Peer Review. Peer review involves soliciting feedback from colleagues or experts in a particular technical field. Peer review can provide valuable insights into an individual's technical abilities, strengths, and weaknesses. Peer review can be conducted through formal mechanisms, such as performance reviews or evaluations, or through informal mechanisms, such as feedback sessions or mentorship programs.

Measuring social intelligence

Measuring social intelligence can be a complex and multifaceted process, as social intelligence involves a variety of cognitive and emotional skills that are difficult to assess through traditional measures of intelligence. Measuring social intelligence requires a multi-faceted approach that incorporates a range of different methods and measures. Researchers and practitioners may choose to use one or more of these approaches, depending on their research questions, available resources, and desired outcomes. However, several approaches have been used to measure social intelligence.

Self-Report Measures. Self-report measures are questionnaires or surveys that ask individuals to report on their social skills, abilities, and behaviours. These measures typically assess different aspects of social intelligence, such as empathy, social awareness, and communication skills, and may ask individuals to rate themselves on a scale from «strongly agree» to «strongly disagree». Self-report measures have the advantage of being relatively easy to administer and can provide insight into an individual's self-perception of their social skills.

Behavioural Observations. Behavioural observations involve directly observing an individual's social skills and behaviours in real-world or simulated social situations. These observations may be conducted by trained assessors or peers and can provide insight into an individual's ability to perceive social cues, communicate effectively, and build relationships. Behavioural observations can be time-consuming and resource-intensive, but they can provide rich and detailed information about an individual's social intelligence.

Performance Tasks. Performance tasks are assessments that require individuals to complete specific social tasks or scenarios, such as interpreting emotions from facial expressions, role-playing social interactions, or making social judgments based on limited information. These tasks can be used to assess different aspects of social intelligence, such as social cognition, emotional intelligence, and social problem-solving. Performance tasks can be challenging to develop and administer, but they can provide objective and standardized measures of social intelligence.

Measuring innovation projects manager intelligence

Measuring innovation projects manager intelligence involves assessing their cognitive and emotional intelligence, as well as their job-specific skills and knowledge. Measuring manager intelligence requires a multi-faceted approach that incorporates a range of different

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methods and measures. Employers and organizations may choose to use one or more of these approaches, depending on their goals, available resources, and desired outcomes.

Here are some common methods for measuring manager intelligence.

Cognitive Ability Tests. Cognitive ability tests are designed to assess an individual's problem-solving abilities, reasoning skills, and ability to learn new information. These tests may include assessments of verbal reasoning, numerical reasoning, and abstract reasoning. Cognitive ability tests are often used in recruitment and selection processes to identify individuals who have the cognitive capacity to succeed in a managerial role.

Emotional Intelligence Assessments. Emotional intelligence assessments are designed to assess an individual's ability to perceive, express, and regulate emotions, as well as their ability to perceive and respond to the emotions of others. These assessments may include self-report measures and/or behavioural observations. Emotional intelligence assessments can provide valuable insight into a manager's ability to lead and motivate others.

Skills Assessments. Skills assessments are tests or evaluations that measure an individual's job-specific skills and knowledge. These assessments may include written tests, practical exams, or simulations that assess a manager's ability to perform job-related tasks and solve job-related problems. Skills assessments may also include peer evaluations or performance reviews that provide feedback on a manager's job performance.

360-Degree Feedback. 360-degree feedback is a process where feedback is solicited from multiple sources, such as subordinates, peers, and supervisors. 360-degree feedback can provide valuable insight into a manager's strengths and weaknesses, as well as their ability to communicate, collaborate, and lead effectively.

Measuring the competence of an innovation project manager based on the P2M system can be done through a series of steps. The P2M system is a project and program management methodology that focuses on innovation and value creation. By following the steps, you can effectively measure an innovation project manager's competence based on the P2M system and develop a plan to improve their skills and capabilities. There are steps to measure an innovation project manager's competence based on the P2M system.

Define the competencies. Identify the competencies that are critical to success in an innovation project management role. These may include technical knowledge, leadership skills, problem-solving ability, strategic thinking, creativity, and communication skills.

Develop the assessment criteria. Develop a set of assessment criteria that align with the identified competencies. For example, if creativity is identified as a critical competency, the assessment criteria may include the ability to generate novel ideas, willingness to take risks, and ability to see connections between seemingly unrelated concepts.

Conduct a self-assessment. Ask the project manager to complete a self-assessment using the defined assessment criteria. This will provide a baseline understanding of the manager's strengths and areas for improvement.

Conduct a peer assessment. Ask peers, colleagues, or stakeholders to provide feedback on the project manager's performance using the same assessment criteria. This can provide additional insight into the manager's competence and identify areas for improvement.

Analyze the results. Analyze the results of the self and peer assessments to identify patterns and areas for improvement. Use this information to develop a development plan that addresses the identified gaps in competence.

Monitor progress. Monitor the project manager's progress over time to ensure that the development plan is effective and that the manager is making progress towards improving their competence.

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Mathematical model of the dynamic intellectual model architecture

We define architecture A by the following tuple.

$$\mathrm{A} = < I_7, F_i, C_i, P_i >,$$

where I_7 – $7D$ integrated intelligence model;
F_i – Fluid intelligence;
C_i – Crystallized intelligence;
P_i – Innovation product.

Each element of the architecture has its own structure of components, which is designed to assess the level of performance in the process of creating an innovative product.

The sequence of application of the model F_i, C_i, P_i determines the value chain Vi of an innovative product based on the dynamic component F_i the knowledge system C_i. At the same time, the dynamic model and the knowledge system actively interact with the $7D$ intelligence model.

$$D_7 = \{E_i, S_i, Cu_i, M_i, T_i, St_i, B_i\},$$

where E_i – Emotional Intelligence;
S_i – Social intelligence;
Cu_i – Cultural Intelligence;
M_i – Managerial intelligence;
T_i – Technical intelligence;
St_i – Strategic Intelligence;
B_i – Business intelligence.

This model ensures the completeness and integrity of the system of preparation and decision-making in the process of managing an innovative project.

Each component of the model has its own structure, which is given in Section 3. At the same time, Section 4 defines tools for assessing the level of intelligence, which determines the overall effectiveness of the innovation project management process. The components of the model have their own weight values of influence on the effectiveness of the implementation of an innovative project. In this case, the influence optimization model of a dynamic integrated system looks like this:

$$E_i = \max F(w_1 \mathrm{E_i}, w_2 S_i, w_3 Cu_i, w_4 M_i, w_5 T_i, w_6 St_i, w_7 B_i),$$

where F is a function that determines the contribution of each component of the model to the efficiency of managing an innovative project;

$w_1, w_2, \ldots . w_7$ – weight coefficients of $7D$ model elements.

The elements of the proposed model are implemented as a case study in section 6.

Application dynamic integrated intelligence model in Agile environment

The dynamic integrated intelligence model can be applied in an Agile environment to enhance the cognitive and social-emotional skills of Agile team members [22]. Applying the dynamic integrated intelligence model in an Agile environment can lead to better teamwork, enhanced problem-solving abilities, and improved project outcomes. By focusing on cognitive abilities, motivation, and social and emotional factors, Agile teams can develop a holistic

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approach to project delivery that emphasizes collaboration, innovation, and continuous improvement [23]. There is a way the model is applied.

Cognitive Abilities. Agile teams require members with strong cognitive abilities such as problem-solving, critical thinking, and decision-making skills. The dynamic integrated intelligence model can be applied by providing training and resources that improve these skills. This can include workshops or coaching sessions that focus on enhancing the team's analytical and problem-solving abilities.

Motivation. Motivation is a key component of the dynamic integrated intelligence model, and it is critical to Agile teams' success. Agile teams require a high level of motivation to continuously deliver value to stakeholders. Applying the dynamic integrated intelligence model can involve creating a positive and engaging work environment that promotes collaboration, transparency, and continuous improvement.

Social and Emotional Factors. Agile teams need to have strong social and emotional skills to work effectively together. These skills include communication, empathy, and teamwork. The dynamic integrated intelligence model can be applied by providing training and resources that improve these skills. This can include workshops or coaching sessions that focus on enhancing the team's communication and collaboration abilities.

Assessment of a complex system architecture

Assessment of a complex system architecture can be performed using a variety of methods and approaches, depending on the assessment objective, requirements, and constraints. There are some methods of architecture evaluation.

Expert evaluation. This evaluation approach uses the expertise of experts in the system architecture to evaluate its performance and potential problems.

Conformance assessment. This assessment approach is based on checking the compliance of the system architecture with the requirements and standards. This helps ensure system compliance and find ways to improve it.

Modelling and Simulation. This evaluation method uses modelling and simulation of system performance to evaluate its performance and behaviour in various scenarios. This can help identify potential problems and find solutions.

Risk analysis. This evaluation method is based on the identification of possible risks associated with the system architecture and the assessment of the importance of each risk. This approach can help identify the most vulnerable parts of the system that need improvement.

Problem Analysis. This evaluation approach focuses on identifying problems in the system architecture and evaluating their impact on system functionality and performance. Problem analysis can help find ways to improve the architecture and reduce possible risks.

Case study of application DIIM

As a model and tool for assessing the competence of a team of managers applying 'Cross-domain competencies for healthy and safe work in the 21st century – WORK4CE' Erasmus+ project. The research was carried out by a team from the Kyiv National University of Construction and Architecture. The IPMA OCB scheme [4] was used to assess the dynamics of a team in managing an innovative project. For this case, have been used expert evaluation method according to the team development process.

The case study checks the proposed architecture of the Dynamic Integrated Intelligence Model system in two directions.

1. Analyses dynamic of application DIIM.
2. Analyses problems.

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Average assessments of the competence of team members at the initial stage, after 6 and 12 months of implementation on a scale of 1-5 are shown in Table. 1. The 14 members of the project expert team participated in the evaluation process.

Table 1. Team Competence Assessments Based on Dynamic Integrated Intelligence Model

№	Competencies	Start	6 mon.	12 mon.
1	Fluid intelligence	1	2	3
2	Crystallized intelligence	2	3	4
3	Strategic Intelligence	1	3	4
4	Emotional Intelligence	2	3	3
5	Cultural Intelligence	1	2	3
6	Cognitive Intelligence	1	3	3
7	Social Intelligence	1	2	3
8	Business Intelligence	2	3	4
9	Technical Intelligence	2	3	3

The analysis of dynamics showed a high dynamic of the system development within the selected control points. So significant dynamics were shown by Fluid intelligence and Strategic Intelligence. Other components also showed dynamics during the indicated period. This may be an indirect confirmation of the effectiveness of the proposed architecture.

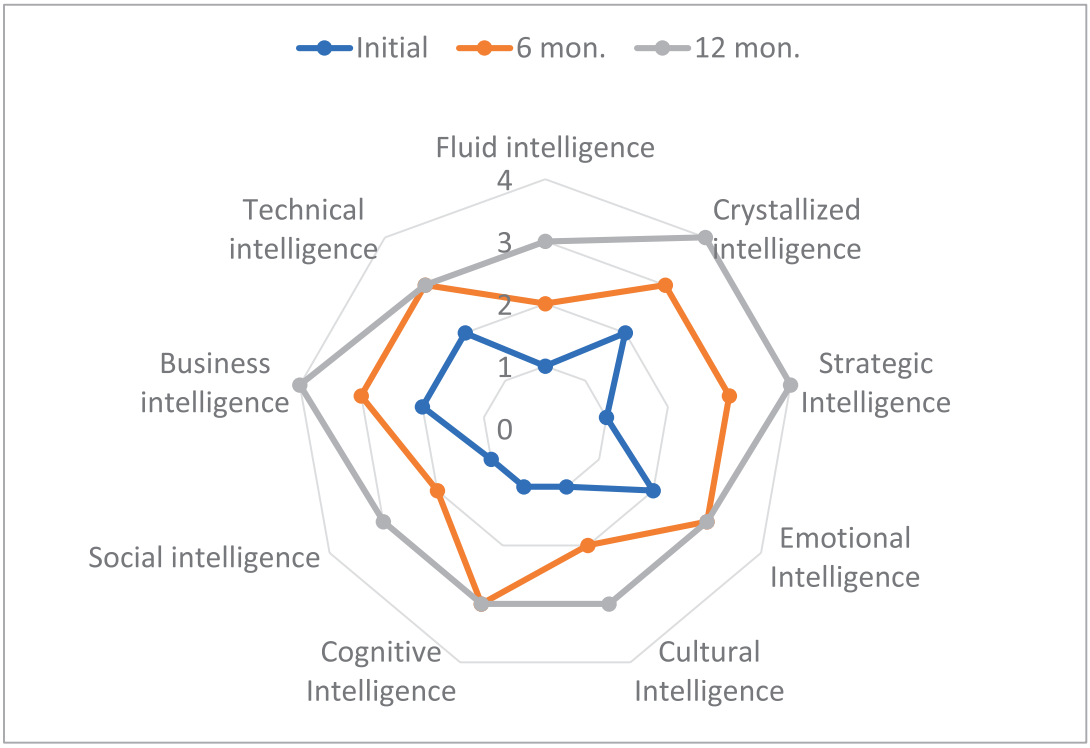

Figure 2. Spider diagram with competence assessment of the project team on initial, 6 and 12 mon

The spider diagram within this case shows the dynamics of the formation of competencies and technological maturity of the team within the life cycle of the project. At the same time, special dynamics were observed in the field of business intelligence, strategic intelligence and crystallized intelligence.

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Assessing problems in integrated intelligence system architecture is a complex and nuanced task, but several approaches can be taken to help identify issues and potential solutions in our case. A comprehensive approach that involves multiple methods of analysis and engagement with stakeholders is likely to be the most effective way to assess problems in system architecture.

Review documentation and specifications. Start by reviewing any available documentation or specifications related to the system architecture. This can help you gain a better understanding of the design and implementation and identify any areas that may be problematic. Analyzing documents has been done without a problem. Testing is an important part of identifying problems in system architecture. This can include unit testing, integration testing, and functional testing, among others.

Security audit. Security should always be a key consideration when assessing system architecture. Conduct a thorough security audit to identify any vulnerabilities or potential attack vectors. This security audit had been done with the application of Confluence tools.

Engage with stakeholders. Engage with stakeholders such as developers, system administrators, and end-users to identify any issues or concerns they may have with the system architecture. In this project, all stakeholders have been engaged.

Conclusion

In conclusion, the application of the dynamic integrated intelligence model can be beneficial for individuals seeking to improve their cognitive abilities and overall intelligence. By focusing on cognitive abilities, motivation, and social and emotional factors, individuals can develop a holistic approach to intellectual development. This can lead to better problem-solving skills, enhanced creativity, and improved academic and professional performance. Ultimately, the dynamic integrated intelligence model provides a valuable framework for understanding and improving intelligence, both for individuals and for organizations seeking to foster intellectual development in their employees.

The dynamic integrated intelligence model is a comprehensive framework for understanding how intelligence operates and can be developed over time. It involves multiple components, including cognitive abilities, motivation, and social and emotional factors. When applying this model, it is important to consider how these different factors interact and how they can be leveraged to enhance intelligence.

References

1. Davidson, J.E., & Downing, C.L. (2000). Contemporary models of intelligence. *Handbook of intelligence*, 34-49. https://doi.org/10.1017/CBO9780511977244.005
2. Hopkins, A. (1999). Intelligence Models and Best Practices. *Lawrenceville, NJ: International Association of Law Enforcement Intelligence Analysts*.
3. International Project Management Association. (2015). Individual Competence Baseline for Project, Programme & Portfolio Management (Version 4). 415.
4. IPMA. (2013). IPMA Organisational Competence Baseline (IPMA OCB). 67p.
5. P2M, Project Management Association of Japan (PMAJ). (2017). A Guidebook of Program & Project Management for Enterprise Innovation, Third Edition (427 p.).
6. Project Management Institute. (2021). A Guide to the Project Management of the Knowledge (PMBOK® Guide), Seventh Edition (370 p.).
7. Project Committee ISO/PC 236. (2020). ISO 21502. Guidance on project management (52p.).
8. Project Committee ISO/PC 236. (2017). ISO 21503:2017. Project, programme and portfolio management — Guidance on programme management (52p.).
9. Project Committee ISO/PC 236. (2015). ISO 21504:2015. Project, programme and portfolio management — Guidance on portfolio management (24p.).

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10. Project Committee ISO/PC 236. (2017). ISO 21505:2017. Project, programme and portfolio management — Guidance on governance (11p.).
11. Obradović, V., Todorović, M., & Bushuyev, S. (2019). Sustainability and agility in project management: contradictory or complementary? In *Advances in Intelligent Systems and Computing III: Selected Papers from the International Conference on Computer Science and Information Technologies, CSIT 2018, September 11-14, Lviv, Ukraine* (pp. 522-532). Springer International Publishing. https://doi.org/10.1007/978-3-030-01069-0_37
12. Pherson, R. H., & Heuer, R. J. (2020). *Structured Analytic Techniques for Intelligence Analysis*. SAGE Publications Inc. (384p.).
13. Jung, J.Y., Chin, C.H., & Cardoso, J. (2011). An entropy-based uncertainty measure of process models. *Information Processing Letters*, *111*(3), 135-141. https://doi.org/10.1016/j.ipl.2010.10.022
14. Belack, C., Di Filippo, D., & Di Filippo, I. (2019). *Cognitive readiness in project teams: Reducing project complexity and increasing success in project management*. CRC Press.
15. Drouin, N., Müller, R., Sankaran, S., & Vaagaasar, A. L. (2021). Balancing leadership in projects: Role of the socio-cognitive space. *Project Leadership and Society*, *2*, 100031. https://doi.org/10.1016/j.plas.2021.100031
16. Bushuyev, S., Murzabekova, A., Murzabekova, S., & Khusainova, M. (2017, September). Develop breakthrough competence of project managers based on entrepreneurship energy. In *2017 12th International Scientific and Technical Conference on Computer Sciences and Information Technologies (CSIT)* (Vol. 2, pp. 11-16). IEEE. https://doi.org/10.1109/STC-CSIT.2017.8099420
17. NCIS. (2000). The Availability of Information on the National Intelligence Model (42p.).
18. Global alliance for project performance standards. Global PM standarts http://www.globalpmstandards.org/
19. Cotterman, H., Forsberg, K., & Mooz, H. (2005). *Visualizing project management: models and frameworks for mastering complex systems*. John Wiley & Sons.
20. Slivitsky, A. (2006). Value migration. Mann, Ivanov & Ferber. (432 p.).
21. Bushuyev, S., Bushuiev, D., Zaprivoda, A., Babayev, J., & Elmas, Ç. (2020, February). Emotional Infection of Management Infrastructure Projects based on the Agile Transformation. In *ITPM* (pp. 1-12).
22. Project Management Institute. (2017). Agile Practice Guide: Paperback (210 p.). USA.
23. Wiley. (2018). A Systems Approach to Planning, Scheduling, and Controlling (10th ed., 1120 p.). New Jersey, USA.